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## PLATING APPARATUS AND METHOD

ABSTRACT OF THE DISCLOSURE

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An apparatus for plating a conductive film directly on a substrate with a barrier layer on top includes anode rod (1) placed in tube (109), and anode rings (2), and (3) placed between cylindrical walls (107) and (105), (103) and (101), respectively. Anodes (1), (2), and (3) are powered by power supplies (13), (12), and (11), respectively. Electrolyte (34) is pumped by pump (33) to pass through filter (32) and reach inlets of liquid mass flow controllers (LMFCs) (21), (22), and (23). Then LMFCs (21), (22) and (23) deliver electrolyte at a set flow rate to sub-plating baths containing anodes (3), (2) and (1), respectively. After flowing through the gap between wafer (31) and the top of the cylindrical walls (101), (103), (105), (107) and (109), electrolyte flows back to tank (36) through spaces between cylindrical walls (100) and (101), (103) and (105), and (107) and (109), respectively. A pressure leak valve (38) is placed between the outlet of pump (33) and electrolyte tank (36) to leak electrolyte back to tank (36) when LMFCs (21), (22), (23) are closed. A wafer (31) held by wafer chuck (29) is connected to power supplies (11), (12) and (13). A drive mechanism (30) is used to rotate wafer (31) around the z axis, and oscillate the wafer in the x, y, and z directions shown. Filter (32) filters particles larger than 0.1 or 0.2  $\mu\text{m}$  in order to obtain a low particle added plating process.